Preventive and therapeutic potentials of anthocyanins in diabetes and associated complications

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Diet is an essential factor affecting the development of and risk for diabetes mellitus. In search of preventative and therapeutic strategies, the potential role of certain foods and their bioactive compounds to prevent the pathogenesis associated with metabolic diseases is to be considered. Human consumption of anthocyanins is among the highest of all flavonoids. Epidemiological studies have suggested that the consumption of anthocyanins lowers the risk of diabetes and diabetic complications. Anthocyanins are important natural bioactive pigments responsible for red to blue colour of fruits, leaves, seeds, stems and flowers, which are present in a variety of plant species particularly in berries and cherries. A large number of bioactive anthocyanins, such as cyanidin, malvidin, delphinidin, pelargonidin, peonidin, petunidin and their metabolites have shown multiple

biological activities with apparent effects on glucose absorption, glucose uptake, insulin secretion and sensitivity, on the enzymes involved in glucose metabolism, gene expressions, inflammatory mediators, glucose transporters in progression of diabetes and associated complications, such as diabetic retinopathy, nephropathy, neuropathy and diabetic vascular diseases. The versatility of the anthocyanins provides a promising approach for diabetes management than synthetic drugs. Here we summarize the effect of several anthocyanins on many in vitro, in vivo and clinical studies and also reveal the mechanisms which could prevent or reverse the underlying mechanisms of diabetic pathologies including promotion of antioxidant, antihyperlipidemic, anti-inflammatory and anti-apoptotic activities.

Anthocyanins

Complications

Diabetes mellitus

Glucose

anthocyanin

cyanidin

cyanidin 3 arabinoside

cyanidin 3 glucoside

cyanidin 3 o beta glucoside

cyanidin 3 rutinoside

cyanidin 3,5 glucoside

delphinidin

glibenclamide

glucose

malvidin chloride

pelargonidin

pelargonidin 3 glucoside

peonidin 3 glucoside

plant glycoside

protocatechuic acid

unclassified drug

anthocyanin

cyanidin

delphinidin

hydroxybenzoic acid derivative

pelargonidin

protocatechuic acid

antiinflammatory activity

antineoplastic activity

antioxidant activity

apoptosis

Aristotelia chilensis

Aronia melanocarpa

Asystasia gangetica

aubergine

berry

bilberry

black currant

blackberry

cherry

cranberry

diabetic complication

diabetic retinopathy

disease association

disease course

enzyme activity

Ficus

Ficus bengalis

flower

fruit color

glucose absorption

glucose level

glucose metabolism

glucose transport

human

in vitro study

in vivo study

insulin release

insulin sensitivity

kidney disease

luminescence

lychee

Morus nigra

mulberry

Myrica

Myrica cerifera

Oreganum vulgare

plant leaf

plant seed

plant stem

Review

rice

risk factor

sour cherry

soybean

strawberry

sweet cherry

sweet potato

Vaccinium arctostaphylos

chemistry

diabetes mellitus

diet

drug effect

fruit

metabolism

oxidative stress

pathology

Anthocyanins

Diabetes Mellitus

Diet

Fruit

Humans

Hydroxybenzoates

Oxidative Stress